55. (New) A multibeam scanning optical apparatus according to claim 49, further comprising an incident optical system for leading the plurality of light beams emitted from said light source to said light deflector.

REMARKS

This application has been carefully reviewed in light of the Office Action dated March 21, 2002 (Paper No. 9). Claims 1 to 18 and 40 to 55 are in the application, with Claims 42 to 55 having been added herein. Claims 1, 12, 42 and 49 are the independent claims. Reconsideration and further examination are respectfully requested.

Claims 8, 11 and 18 were objected to for informalities. In response, Applicant has carefully reviewed and amended these claims to attend to the issues raised in the Office Action. Withdrawal of the objection to Claims 8, 11 and 18 is therefore respectfully requested.

Applicant thanks the Examiner for the indication that Claims 1 to 11, 40 and 41 have been allowed. Claims 40 and 41 have been amended to depend from any one of the apparatus claims in the application, namely Claims 1 to 18 and 42 to 55. Because all claims currently in the application are believed to be in condition for allowance, as discussed in more detail below, Claims 40 and 41 are believed to remain in condition for allowance.

Claims 12 and 18 were rejected under 35 U.S.C. § 102(b) over U.S. Patent No. 4,878,066 (Shiraishi); Claim 13 was rejected under § 103(a) over Shiraishi in view of U.S. Patent No. 5,963,356 (Kato); Claim 14 was rejected over § 103(a) over Shiraishi in view of U.S. Patent No. 5,365,259 (Kanoto); Claim 15 was rejected under § 103(a) over

Shiraishi in view of U.S. Patent No. 6,124,962 (Kamikubo); and Claims 16 and 17 were rejected under § 103(a) over Shiraishi in view of Kamikubo and further in view of Kanoto. Applicant has carefully reviewed and considered the Examiner's remarks and the applied references and respectfully submits that the claims herein are patentably distinguishable over the applied references for at least the following reasons.

The present invention concerns a multibeam scanning optical apparatus in which a plurality of light beams are emitted from a light source. At least one of the plurality of light beams are converged by a detection optical element as at least one detection light beam, which is focused by a beam detector lens. A photodetector controls a timing of a start of scanning of the plurality of light beams by detecting the at least one detection light beam. According to the invention, the detection optical element has its optical surfaces arranged orthogonally relative to an arrangement direction of the at least one detection light beam. In this manner, the photodetector and a center of a scanning width on a surface scanned by the light beams are held to be optically equivalent, thereby reducing jitter due to chromatic aberration of magnification.

With reference to particular claim language, independent Claim 12 concerns a multibeam scanning optical apparatus that includes a light source having a plurality of light emitting sections and a light deflector for deflecting a plurality of light beams emitted respectively from the plurality of light emitting sections of the light source. A scanning optical system focuses the plurality of light beams deflected by the light deflector on a surface to be scanned. A first detection optical element converges at least one of the plurality of light beams deflected by the light deflector as at least one detection light beam. A second detection optical element focuses the at least one detection light beam converged

by the first detection optical element and a photodetector controls a time of a start of scanning of the plurality of light beams by detecting the at least one detection light beam focused by the second detection optical element. The first detection optical element has its optical surfaces arranged orthogonally relative to an arrangement direction of the at least one detection light beam.

The applied references are not understood to disclose the foregoing features of the present invention. In particular, the applied references are not understood to disclose at least the feature of a first detection optical element for converging at least one of a plurality of beams deflected by a light deflector as at least one detection light beam, where the optical surfaces of the first detection optical element are arranged orthogonally relative to an arrangement direction of the at least one detection light beam.

Specifically, Shiraishi concerns an optical apparatus in which multiple laser beams are emitted and scanned on a photosensitive drum. According to Shiraishi, a light-amount detector detects laser beams that have been focused by a cylindrical lens, with control of the laser beams being determined by the detection result. The Office Action asserts that this cylindrical lens corresponds to the detection optical element of the present invention. Applicant respectfully disagrees with this characterization of Shiraishi.

Claim 12 includes a first detection optical element, which converges at least one of a plurality of light beams deflected by a light deflector as at least one detection light beam, and a second detection optical element, which focuses the at least one detection light beam for detection by a photodetector. Applicant asserts that the cylindrical lens of Shiraishi corresponds to the second detection optical element of the present invention rather than the first detection optical element. The f-θ lens of Shiraishi, which might be

considered to correspond to the first detection optical element of the present invention, is not understood to have the characteristics of the first detection optical element. Specifically, the f-θ lens of Shiraishi is not understood to have its optical surfaces arranged orthogonally relative to an arrangement direction of detection light beams. Therefore, Shiraishi is not understood to disclose at least the feature of a first detection optical element for converging at least one of a plurality of beams deflected by a light deflector as at least one detection light beam, where the optical surfaces of the first detection optical element are arranged orthogonally relative to an arrangement direction of the at least one detection light beam.

Kato, Kanoto and Kamikubo, which were applied in the rejections of certain dependent claims, are not seen to disclose anything to remedy the foregoing deficiencies of Shiraishi. Kato was cited in the Office Action for its disclosure of an anamorphic optical element. Kanoto was cited for its disclosure of an optical element being made of plastic. Kamikubo was cited for its disclosure of refractive and diffractive lens structure. However, none of these references, either alone or in combination with Shiraishi, are seen to disclose or suggest at least the feature of a first detection optical element for converging at least one of a plurality of beams deflected by a light deflector as at least one detection light beam, where the optical surfaces of the first detection optical element are arranged orthogonally relative to an arrangement direction of the at least one detection light beam.

The Office Action contends that Kanoto discloses an arrangement of a detection optical element having its effective surfaces orthogonal to detection light beams. While the condenser lens in Kanoto might be construed to be orthogonal to the detection light beam, which Applicant does not concede, the condenser lens of Kanoto corresponds

to the second detection optical element of the present invention rather than the first detection optical element. The f-θ lens of Kanoto, which might be seen correspond to the first detection optical element, is not seen to be arranged having its optical surfaces orthogonally relative to an arrangement direction of the at least one detection light beam.

Accordingly, independent Claim 12 is believed to be allowable over the applied references. Reconsideration and withdrawal of the § 102(b) rejection of Claim 12 are respectfully requested.

New independent Claim 42 concerns a multibeam scanning optical apparatus that includes a light source having a plurality of light emitting sections and a light deflector for deflecting a plurality of light beams emitted respectively from the plurality of light emitting sections of the light source. A scanning optical system focuses the plurality of light beams deflected by the light deflector on a surface to be scanned. A photodetector controls a timing of a start of scanning of the plurality of light beams by detecting at least one of the plurality of light beams deflected by the light deflector as at least one detection light beam. A detection optical element converges the at least one detection light beam and leads it to the photodetector, where the detection optical element has a refractive power in the main-scanning direction. The detection optical element has its optical surfaces arranged orthogonally relative to an arrangement direction of the at least one detection light beam.

The references applied in the Office Action are not seen to disclose or suggest the foregoing features of the present invention. In particular, Shiraishi, Kato, Kanoto and Kamikubo, either alone or in combination, are not seen to disclose or suggest at least the feature of a detection optical element having a refractive power in the main-

scanning direction and having its optical surfaces arranged orthogonally relative to an arrangement direction of at least one detection light beam. Therefore, independent Claim 42 is believed to be allowable over the applied references.

New independent Claim 49 concerns a multibeam scanning optical apparatus that includes a light source having a plurality of light emitting sections and a light deflector for deflecting a plurality of light beams emitted respectively from the plurality of light emitting sections of the light source. A scanning optical system focuses the plurality of light beams deflected by the light deflector on a surface to be scanned. A photodetector controls a timing of a start of scanning of the plurality of light beams by detecting at least one of the plurality of light beams deflected by the light deflector as at least one detection light beam. A detection optical element converges the at least one detection light beam and leads it to the photodetector. The photodetector and the center of a scanning width in the main scanning direction on the surface to be scanned are held optically equivalent.

The references applied in the Office Action are not seen to disclose or suggest the foregoing features of the present invention. In particular, Shiraishi, Kato, Kanoto and Kamikubo, either alone or in combination, are not seen to disclose or suggest at least the feature of a photodetector and a center of a scanning width in the main scanning direction on a surface to be scanned being held optically equivalent. Therefore, independent Claim 49 is believed to be allowable over the applied references.

The other claims in this application are each dependent from the independent claims discussed above and are therefore believed to be allowable over the applied references for at least the same reasons. Because each dependent claim is deemed

to define an additional aspect of the invention, however, the individual consideration of each on its own merits is respectfully requested.

In view of the foregoing amendment and remarks, the entire application is believed to be in condition for allowance and such action is respectfully requested at the Examiner's earliest convenience.

Applicant's undersigned attorney may be reached in our Costa Mesa, California, office by telephone at (714) 540-8700. All correspondence should be directed to our address given below.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE TO CLAIMS

8. (Twice Amended) A multibeam scanning optical apparatus according to claim 2, further comprising an incident optical system for leading [a] the plurality of light beams emitted from said light source to said optical deflector.

11. (Amended) A multibeam scanning optical apparatus according to claim 1, wherein said photodetector detects part of each of [a] the plurality of light beams deflected by said [optical] light deflector and controls the timing of the start of scanning of each of [said] the plurality of light beams.

12. (Twice Amended) A multibeam scanning optical apparatus comprising:

a light source having a plurality of light [beam] emitting sections;

a light deflector for deflecting a plurality of light beams emitted respectively from said plurality of light [beam] emitting sections of said light source;

a scanning optical system for [focussing said] focusing the plurality of light beams deflected by said light deflector on a surface to be scanned;

[a photodetector for controlling a timing of a start of scanning of said plurality of light beams by detecting a part of said plurality of light beams deflected by said light deflector as detection light beams; and]

a first detection optical element for converging [said detection light beams and leading them to said photodetector] at least one of the plurality of light beams deflected by said light deflector as at least one detection light beam;

a second detection optical element for focusing the at least one detection light beam converged by said first detection optical element; and

a photodetector for controlling a time of a start of scanning of the plurality of light beams by detecting the at least one detection light beam focused by said second detection optical element,

wherein said first detection optical element has its optical surfaces arranged orthogonally relative to [said] an arrangement direction of the at least one detection light beam[s].

13. (Amended) A multibeam scanning optical apparatus according to claim 12, wherein said first detection optical element comprises an anamorphic lens.

14. (Amended) A multibeam scanning optical apparatus according to claim 12, wherein said first detection optical element is made of a plastic material.

17. (Amended) A multibeam scanning optical apparatus according to claim 16, wherein said first detection optical element and said refraction optical element are integrally formed by using a plastic material.

18. (Twice Amended) A multibeam scanning optical apparatus according to claim 12, further comprising an incident optical system for leading [a] the plurality of light beams emitted from said light source to said [optical] light deflector.

40. (Amended) An image forming apparatus comprising:

a multibeam scanning optical apparatus as defined in any one of claims 1 to [11] 18 and 42 to 55; and

an image carrier arranged on the surface to be scanned.

41. (Amended) A color image forming apparatus comprising:

a multibeam scanning optical apparatus as defined in any one of claims 1 to [11] 18 and 42 to 55; and

a plurality of image carriers arranged respectively on the surface to be scanned for forming different images.

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